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bats, I am very positive that their condition was not that of ordinary slumber, and the tropical temperature, at the time, even through the night, certainly suggests æstivation as the most plausible explanation of the phenomena I have described.

C. C. ABBOTT.

THE LIFE OF GEN. EMORY UPTON.

GENERAL EMORY UPTON, at the time of his early death in 1881, was probably the most accomplished officer in the United States army. He had a genius for the science of military tactics, and, as a thinker and writer upon this subject, has left a name of enduring renown. General Michie, the well-known professor of physics at West Point, aided by General James H. Wilson, who was distinguished in the cavalry service during the civil war, has recently published an extended memoir of Upton, tracing the various steps of his advancement through boyhood, with his strong desire to go to West Point; through his cadet life, in which he won high rank; through his varied and arduous experience in the three branches of army service during the war, winning success in each; through his career as the commandant of cadets, as an instructor in artillery at Fortress Monroe, as an official observer and student of the armies of Europe and Asia, and especially as an authority on military principles and practice. General Wilson says of Upton, that he was "as good an artillery officer as could be found in any country, the equal of any cavalry commander of his day, and, all things considered, the best commander of a division of infantry in either the union or rebel army." This is high praise, but the volume by General Michie shows how such success was won, and leads us to believe that Upton's name, as years roll by, will be honored more and more as one of the greatest tacticians of modern times. His personal character was as remarkable as his professional. Like Havelock, Stonewall Jackson, Chinese Gordon, and many other heroes, he developed a religious life of the purest and most lofty type. Toward the end of his life he was engaged upon a study of the military policy of the United States during the revolution, and from that time down to the year 1862, when his manuscript ends. In this work he was associated with his classmate at West Point, Col. H. A. Du Pont, by whom the task will doubtless be completed. From the outline given by General Michie, it is clear that the treatise will be of the greatest value, not to military men only, but

to all students of history, and especially to statesmen. It will throw a great deal of light on the causes of success and of failure in the various campaigns which have taxed the resources of our countrymen. The publication of this manuscript is greatly to be desired.

As a soldier and as a writer, Upton may be described as one who applied the principles of scientific method to the organization and management of armies. His aim was lofty; his success was great.

DOOLITTLE'S PRACTICAL ASTRONOMY.

PROFESSOR DOOLITTLE has given us an excellent manual, either for the student or for the worker in the field. Intended only for field astronomy and navigation, we find no treatment of observational methods with large instruments, but its own field is thoroughly covered. "The author has not sought after originality, but has attempted to present in a systematic form the most approved methods in actual use at the present time." It is a comfort to turn the pages and find standard formulæ in a familiar dress. Much of the 'originality' of many modern text-books consists in rigging out old accepted formulæ in a new alphabetical suit, so that no one can be quite sure he is using just the right one without constant reference to the great 'original.'

We can only give an outline of the contents. The introduction develops in a simple but thorough manner the method of least-squares and the subject of interpolation. The different systems of spherical co-ordinates, the formulæ for their transformation and for parallax, refraction, etc., are very completely developed. Under the subject of angular measurements, verniers, micrometer-microscopes, graduated circles and their sources of error, chronometers, clocks, and chronographs are fully described and investigated. With the treatment of the adjustments and errors of the sextant, is introduced an example of the determination of the eccentricity by star observations, from the work of Professor Boss on the northern boundary survey; and chapter v. develops thoroughly the best methods of determining time and latitude by the sextant or any altitude instrument. The transit-instrument in its various forms, both in the meridian and prime-vertical, is very fully treated; likewise the determination of longitude by chronometers, by telegraph, by lunar distances, by moon-culminations, and by occultations of stars. Of course, the zenith-telescope claims its due share of attention, and an unusually complete chapter

Life and letters of Emory Upton, Brvt. Maj.-Gen. U. S. army. By PETER S. MICHIE. With an introduction by Jas. Harrison Wilson. New York, Appleton, 1885. 28+511 p. 8°.

A treatise on practical astronomy, as applied to geodesy and navigation. By C. L. DOOLITTLE. New York, Wiley, 1885. 8°.

on the determination of azimuth follows it. The book closes with a very full and clear setting-forth of the subjects of precession, nutation, aberration, and proper-motion, with the formulæ for their application, and a set of tables most useful to the field-astronomer in reducing observations.

The most valuable and characteristic feature of the book is the excellent series of examples taken from actual modern practice, which accompany almost every method of using each instrument, and are fully discussed by the method of least-squares where its application is advantageous. There is throughout an endeavor to impress the importance of developing the degree of accuracy inherent in the observations, and the best methods of avoiding or eliminating systematic errors. The whole work bespeaks the thorough master of his subject. The warning as to parts of the normal-equations solution not checked by the proof-formulæ, the giving of the complete values of the auxiliaries in the formulæ for the weight-coefficients out to four unknown quantities, and many other points which would be overlooked by the mere book-maker or pure theorist, show that Professor Doolittle has thoroughly beaten the whole ground, and knows where the difficulties lie.

The typography of the book is excellent, and Professor Doolittle's known thoroughness gives us assurance that much less than the usual number of mistakes will be found in the printed text.

MEXICAN ETHNOLOGY.

THE magnificent ethnologic museum of the Trocadéro at Paris is one of the sights of that great capital which no scientific visitor should overlook. It is particularly rich in its American department, and the conservator of the museum, Dr. Hamy, has taken a pride not only in collecting in this department, but in studying his specimens and in publishing the results of his studies. As editor of the excellent *Revue d'ethnographie* he has always at his command a medium to give them promptly to the world. He has collected a number of these studies under the title, 'Decades Americanæ.' They treat of such topics as 'An anthropolith from Guadelupe,' 'Fishing industry in ancient times in the Californian Archipelago,' 'The Tzompantli,' 'An Aztec arrangement for supporting skulls,' 'The American solar wheel,' 'A pipe from King's Mound, Ashland,' etc. All these articles are

Mission scientifique au Mexique et dans l'Amérique Centrale. Anthropologie du Mexique. Par M. E.-T. HAMY. Paris, Imprimerie nationale, 1884. 4°.

Decades Americanæ. Mémoires d'archéologie et d'ethnographie Américaines. Par le Dr. E.-T. HAMY. Paris, 1884.

freely illustrated, and the specimens are described and discussed with clearness and from an astonishing width of special reading.

The 'Anthropology of Mexico' is a work of much more ambitious character. In this large and handsome quarto published by the French government, Dr. Hamy discusses the human remains that have been collected by French explorers in various portions of Mexico. He places them in relation with the oldest relics of the stone age from the same region, and reaches the conclusion that the implements, at any rate, point to a period and condition of human life exactly the same as existed in the United States and Europe during the epoch of unpolished stone. In the crania examined the principal characteristics were marked prognathism and brachycephalism. These traits the author thinks are especially pronounced in the skulls of the Otomis and Mazahuas. Besides the minute descriptions and abundant lithographic illustrations with which he enlightens his topic, he enters somewhat fully into the earliest legendary history of Mexican ethnography, attempting to define more closely the identity and relations of those mysterious people, the Quinamies, the Olmecs, and the Xicalancos. He wisely, however, treads with caution on this very uncertain ground.

ASTRONOMICAL NOTES.

Longitude signals between St. Louis and Mexico. — Professor H. S. Pritchett, director of the observatory of the Washington university at St. Louis, kindly communicates the results of a longitude campaign between his observatory and the Observatorio nacional de Mexico, Sr. A. Anguiano, director. A preliminary discussion gives $35^m 57^s.25$ as the difference of longitude, or $6^h 36^m 46^s.41$ W. of Greenwich as the resulting longitude of the transit-circle piers of the Mexican observatory. This differs $5^s.0$ from the old value determined by moon-culminations. The circuit was 2583 miles long, with five repeaters, and the armature time was quite constant, averaging $0^s.38$. The outfit of the Mexican national observatory includes a 15-inch equatorial by Grubb, and an 8-inch meridian-circle, and a 6-inch transit, both by Troughton and Simms. The *personnel* consists of the director (Sr. Anguiano) and five assistants.

Comet observations at Greenwich. — The somewhat unusual appearance in the *Astronomische nachrichten* (2688) of comet-observations communicated by the astronomer-royal attracts our attention, and we trust this is only the beginning of a continuous series. One point, we think, is worth noting. As communicated, they give the meas-